Economics And The Engineer

By E. L. BOWERS*

"Demands of business have been responsible for changes in the curriculum of the technical schools. Today big corporations do not want simply a trained engineer. They want a cultured man who can address a board of directors, who can write a report in acceptable English; not only a 'shopman' but a man with a broad background."

In outlining the above requirements, Dean Burke of the University of Pennsylvania is not describing the ideal training for the engineer; rather, he is merely stating pertinent facts relative to the education of those who today aspire to the engineering profession. Unless one is able to express what he knows, both orally and in writing, he cannot hope to persuade others that he really knows anything. Failing to do this, he can expect but little recognition from those who are responsible for his future advancement.

The majority of engineering students probably derive more satisfaction in examining the parts of a motor or in trying out the new slide-rule than in writing English themes or in stydying German psychology, or in analyzing problems in economics. In fact, they even may detest English and economics and all other subjects which do not appear to have an immediate and practical value, feeling that the time spent on these subjects is just so much taken from the favorite studies. This is to be expected. It is only when an engineer, or anyone else, reaches the conclusion that any particular effort ultimately will bear fruit that he is willing to make the effort.

> More and more as time goes on, the importance of Economics to the Engineer is being recognized. The old idea, that the Engineer was one whose work had only to do with the shaping of materials is rapidly passing. He must be able to manage and conduct business as well as understand his technical field, for often he finds himself in the position of an executive where simply a thorough technical training will not suffice. The science of "wealth getting and wealth using" is becoming of vital interest to the engineer.
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> Mr. Bowers of the Economics Department, who has been teaching some of the engineering lacsses in Economics, in this article discusses some of the relations between Economics and Engineering.
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> —Editor.

One of the subjects introduced into the curriculum of most engineering schools in recent years, and one applicable to the above discussion, is economics. The reasons for its inclusion are easily understood. Engineers take positions with business concerns. At any tme they may be called upon to act in a business capacity. If they succeed in rising to responsible positions they must of necessity deal with those things which are the subject matter of economics. Recently an engineer, trained in an Ohio School and not yet 40 years of age, became the head of an $80,000,000 concern. His engineering knowledge started him on the upward climb. His capacity to reason and act in a business-like manner alone can keep him at the head of this great concern. Formerly business executives made their start in the accounting room; today, the engineering department is in a strategic position in this respect, and is becoming more and more so.

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One occasonally hears it said that such and such a project is satisfactory from an engineering viewpoint but will not pay. No good engineer would make such a statement. The "pay" part is the economics of the situation. Between sound engineering and sound economics there is no conflict. It might be possible to construct a new type of motor and to prepare a new source of fuel but if such motor and fuel cost too much to be of use, or were unable to compete with other motors and fuels, there would be little use in producing them. The products of the engineer eventually find their way to the market. This is true even of the most theoretical types of research. No corporation will spend money for engineering research unless it sees an opportunity ultimately to profit thereby. In short, engineering is inextricably bound up with the price system, and the price system, and the price system is the kernel of economics.

When an electrical engineer, for example, uses a pound of wire there immediately arises the question of price. Why is the wire twenty cents per pound instead of two dollars? If it were two dollars per pound what effect would such price have upon the electrical industry and upon business in general? What does the wire company do with its sale money? How much of it goes to pay wages, interests, rents, et cetera? How much of it is retained as profits? Why are profits large at some times and small at other times? These are only a few of the questions that arise in a study of economics.

But economics does not stop with the wire company and the pound of wire. It analyzes the tariff and considers its effect upon manufacturing and upon agriculture. It delves into problems of transportation and taxation. Banks, money, credit and exchange are also studied. Even socialism and the various other "isms" are examined for the weak and strong points which they contain.

At the present time the number of unemployed persons in the United States is probably not less than two millions. Why should unemployment exist when many workers are anxious to work, when factories stand ready to produce, raw material is available, and people would be only too glad to buy the goods if they just had the wages to do so? This is only one of the many baffling questions in economics.

Compared with the student of business the engineer in the study of economics has one outstanding disadvantage and one advantage. He lacks

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previous training in business subjects. The "theories" of economics seem speculative as compared with the mathematical exactness of engineering problems—much more so in elementary than in advanced work. The method of study is different; it is hard to make a start.

To counter-balance this difficulty is the fact that the previous training of the engineer has fitted him to take a somewhat more scientific attitude toward economic questions than is usually the case of the business student. The engineer is more inclined to consider a protective tariff policy, for example, not from a political viewpoint, but upon a purely efficiency basis. The relative values of competition versus monopoly are not merely questions of "restraint of trade" or of "individual initiative," but of the amount of production that can be realized and the ability of consumers to make use of goods and services once they are produced. Of course, not all engineering students think in this manner. Past experiences and prejudices sometimes interfere with judgments. But the tendency is in the direction of an impartial analysis of ach question, and a very wholesome tendency it is.

Just as economics may do much to raise the place of engineering, so has the influence of the engineer done much to call attention to the evils of the present economic system. The Federated Engineering Societies' study of "Waste in Industry" was not merely a technical analysis of industrial inefficiency; it was a critique of the whole business order. The now celebrated Ontario Hydro Electric Power controversy has so interwoven the engineering with the economic aspects of the problem that one can only conclude that each, while complicating, has measureably assisted the other. If it is a good policy for an engineer to study economics, it is equally desirable that certain groups of commerce students know something about engineering. The beaten path across the campus should run in two directions.

Not all engineers can be heads of automobile concerns or aspirants for the highest office of the government, but each one has an opportunity for advancement in his own particular sphere, which frequently may be removed from the direct engineering field. And whatever that sphere may be the chances of success will depend not only upon engineering skill as such, but upon all of those other things which enforce one's mental alertness and add to the breadth of vision. The "fullness of life" is rarely attained in the laboratory or in the shop alone, but reaches fruition only when to the daily work is added a touch of Raphael, a line from Shakespeare, or perhaps a bit of economics.

NOW YOU KNOW

Passenger (to negro porter while on train for New York) — "What time do we get to New York, George?"

Porter—"We is due to get there at 1:15, unless you has set your watch by Eastern time, which would make it 2:15; then, of co'se, if you is goin' by daylight savings time, it would be 3:15, unless we is an hour an' fifty minutes late—which we is."